Gender, Information Technology, and Developing Countries: An Analytic Study

Executive Summary

LearnLink

We must recognize that information technology is here to stay . . .. What we have to decide is whether we...play the game and turn it to our advantage or lose out completely.

Fatma Alloo, Founder of the Tanzania Media Women's Association, in *Women in the Digital Age—Using Communication Technology for Empowerment: A Practical Handbook,* Society for International Development and UNESCO (1998).

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FOREWORD

To help women and men in developing countries overcome the digital divide, we first need to understand the complex relationship between gender, information technology, and development. How can information technology be used to accelerate development and increase gender equity? Are there barriers to women's entry into the world of information technology? Where are the most persistent barriers to participation? Are there regional differences?

The USAID Office of Women in Development (G/WID) supported the study, "Gender, Information Technology, and Developing Countries," to help answer these questions. This study examines what we do and do not know about the gender dimension of the digital divide. It identifies some of the key barriers to women's participation in information technology, as well as some areas where women already are participating in and benefiting from the use of information technology. Dr. Hafkin and Ms. Taggart have provided a solid foundation for USAID and our colleagues in developed and developing countries as we look for effective ways to address those barriers.

On behalf of USAID's Office of Women in Development, I would like to thank Dr. Anthony Meyer of USAID's Center for Human Capacity Development and Dr. Dennis Foote, Director of the Academy for Educational Development's Learnlink Project, for their cooperation and hard work in producing this study. Recognition also must be given to the pioneering women and men who are expanding the potential of information technology as a tool for economic and social development around the world. It is for these leaders, as well as for those who are not yet a part of the global information society, that we have commissioned this work.

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This booklet contains an Executive Summary of the USAID-supported report *Gender, Information Technology, and Developing Countries: An Analytic Study.* For more information or to obtain printed copies of the full report or the Executive Summary, please contact USAID's Office of Women in Development (WID), 1300 Pennsylvania Avenue, NW, Washington, DC 20523, USA. An electronic version is available on USAID's WID web site: http://www.usaid.gov/wid/pubs.htm. Both this Executive Summary and the full bound copy also may be obtained from AED/LearnLink, 1875 Connecticut Ave, NW, Washington, DC 20009-5721 or downloaded from http://www.aed.org/learnlink.

INTRODUCTION

Information and communication technology (IT) has become a potent force for transforming social, economic, and political life globally. Yet the uneven distribution of IT within societies and across the globe is resulting in a "digital divide" between those who have access to information resources and those who do not. Most women in developing countries are in the deepest part of the divide, further removed from the information age than the men whose poverty they share. Women's lower levels of literacy and education relative to men, as well as negative attitudes towards girls' achievement in science and mathematics, contribute to the gender dimension of the digital divide. In addition, women across the world enjoy a lower degree of economic security than men and face gender-related constraints on their time and mobility. Without access to information technology, an understanding of its significance, and the ability to use it for social and economic gain, women in the developing world will be further marginalized from the mainstream of their communities, their countries, and the world.

IT presents unique and timely opportunities for women. It promises better economic prospects, fuller political participation, communication with the outside world, easy access to information, and an enhanced ability to acquire education and skills and to transcend social restrictions. IT is especially important to poor women because it can provide increased access to resources, the absence of which defines poverty. Hence, it should be viewed as a tool to facilitate access to a variety of development resources rather than as a competing interest. In the context of communication, transportation, and other constraints of the developing world, IT may be even more important for women in developing countries than it is for women in the developed world who have access to an abundance of alternatives.

However, IT is not a panacea for surmounting the obstacles to women's social, political, and economic development. In the context of globalization and shifts in the structure of the international economy, technology-related changes in manufacturing processes might eliminate women's jobs or put them in new jobs with harsh conditions and low pay. IT is a

> In Bangladesh, the cost of hooking up to the Internet could feed a family for a year. In the Philippines...an Internet hookup amounting to US$200 is beyond the reach of even the middle class....It is a luxury item for most families, and access to it is work-related.
>
> Rhona O. Bautista, "Staking Their Claim: Women, Electronic Networking and Training in Asia," in Wendy Harcourt, *Women@Internet: Creating New Cultures in Cyberspace*, London: Zed Books, 1999.

powerful tool, but one which is not always used in a positive way. For example, the Internet is already being employed to promote sexual exploitation and trafficking of women. However, anti-trafficking activists are beginning to explore IT as a means of combating sexual exploitation.

IT policy must be informed by a gender perspective while advocates for gender equality, in turn, must be aware of the opportunities and challenges that technology brings. Failure to consider gender issues in the early stages of technology diffusion may unwittingly generate negative effects on women. Even seemingly gender-neutral decisions about infrastructure can impact women's opportunities to use new technologies. The ways in which women's IT access, participation, and leadership are addressed will determine whether information technology empowers women or contributes to their further economic and social marginalization. While information technology is not without risks, the greatest risk for women is in not joining the global information society.

ACCESS AND OBSTACLES

In many developing countries, less than one percent of the population—male or female—has Internet access. Obtaining reliable statistics on women's Internet use in developing countries is difficult because the standard indicators are rarely disaggregated by sex, and the available data are not very reliable or comparable. However, it is clear that the numbers are small and the distribution limited. Available figures indicate that, by region, women constitute 22 percent of all Internet users in Asia, 38 percent of those in Latin America, and six percent of Middle Eastern users. No regional figures by sex are available for Africa. It should be noted that most women Internet users in developing countries are not representative of women in these countries as a whole but, rather, are part of a small, urban, educated elite.

Statistics by country are particularly puzzling because there does not appear to be any correlation between women's Internet usage and expected indicators such as female literacy rate, female GDP per capita, female representation in professional and technical jobs, or gender empowerment. Developing countries with high female Internet use have low overall Internet use. In countries where the Internet is used primarily by an urban elite, women are well represented. But as GDP rises, the overall dominance of men edges the percentage of female use lower.

A series of factors constrain women's access to IT, including literacy and education, language, time, cost, geographical location of facilities, social and cultural norms, and insufficient computer and information management skills.

Table 1: Women's Internet use in selected developing countries and the United States (1)

Country	Women as % of Internet users, 2000	Total women Internet users in '000s	Total no. Internet users in '000s	Internet users as % of total population	Population in '000s	Female prof. & tech. workers % of total	Female literacy rate	Female GDP per capita (US$)	GDI Rank 1/174
U.S.A.(2)	51.1	83,479	170,280,364	60.0	283,800	53.1	99.0	23,540	3
Philippines	51.0	76.5	150.0	0.6	77,726	65.1	94.3	2510	65
South Africa	51.0	645.6	1,266	4.2	42,835	46.7	83.2	4637	84
Brazil	43.0	1,075	2,500	2.1	169,807	63.3	83.9	3813	67
Croatia	42.0	63.0	150.0	4.3	4,672	n/a	96.4	3557	50
Mexico	42.0	567.0	1,350	2.5	98,553	45.2	87.9	4594	48
Estonia	38.0	57.0	150.0	14.1	1,421	66.8	99.0	4236	49
Russian Fed.	38.0	4,560	12,000	1.8	146,861	n/a	98.8	3503	61
Zambia	37.5	1.13	3.0	0.2	9,461	31.9	67.5	753	125
Uganda	31.5	4.73	15.0	0.1	22,167	n/a	35.0	944	131
China	30.4	6,840	22,500	0.7	1,265,530	45.1	74.5	2485	79
India	23.0	115.0	500.0	0.2	983,377	20.5	39.4	902	112
Poland	18.7	295.6	1,581	5.4	38,607	61.2	99.0	5061	40
Belarus	17.5	14.0	80.0	0.1	6,667	38.4	98.5	3909	54
Ethiopia	13.9	0.83	6.0	0.1	58,390	n/a	29.2	349	172
Slovakia	12.0	60.0	500.0	13.0	5,393	59.7	99.0	6366	39
Czech Republic	12.0	48.0	400.0	6.8	10,286	54.1	99.0	7952	34
Senegal	12.0	.90	7.5	0.3	9,723	n/a	24.8	1253	127
Lithuania	10.0	7.0	70.0	2.9	3,600	67.5	99.0	3323	55
Jordan	6.0	3.7	60.8	1.8	4,435	n/a	81.8	1429	n/a
Colombia (3)	n/a	n/a	350.0	0.0	38,581	45.6	90.8	4725	51
Peru	n/a	n/a	200.0	1.5	26,111	39.4	83.7	2335	71
Turkey	n/a	n/a	450.0	2.3	64,567	33	73.9	4681	73
Thailand	n/a	n/a	200.0	1.3	60,037	54.5	92.8	5000	58
Indonesia	n/a	n/a	300.0	0.2	212,942	40.8	79.5	2359	88
Pakistan	n/a	n/a	61.9	0.1	135,135	21.0	25.4	701	116
Vietnam	n/a	n/a	10.0	0.1	76,236	27.6	89.0	1385	91

Basic literacy and numeracy are needed to read and compose simple messages, navigate the Internet, and execute commands in software applications. As women make up nearly two-thirds of the world's illiterates, and one out of every two women in developing countries is illiterate, women are more likely than men to lack the basic literacy and computer skills that would enable them to take advantage of new global communication opportunities.

P. Fraser-Abder and J.A. Mehta, "Literacy for all," pp. 201-218, in "Missing Links: Gender Equity in Science and Technology for Development." DRC/INIFEM/IT: 1995.

Women take IT courses at a USAID-launched telecenter in Ghana

Education

The single most important factor for increasing the ability of girls and women to take advantage of IT opportunities is education. This requires interventions at all levels, from literacy through scientific and technological education. To prepare women to enter IT fields, the concentrated efforts of the past 10 years to ensure access to quality basic education for girls should be continued and strengthened, with IT integrated into the programs. Indeed, improving the quality and reach of basic education through IT is increasingly essential to mitigating the gender divide for women in developing countries.

Beyond access to basic education, girls and women must be equipped with skills to prepare them for a range of roles in IT as users, creators, designers, and managers. Therefore, efforts should focus on increasing the number of girls and women studying IT-related subjects in formal schooling and seeking IT training outside of school.

Science and technology education is necessary for women to work in IT as computer programmers, engineers, systems analysts, and designers, yet women's low enrollment in math and science courses impedes participation in these IT fields globally. It is interesting and fortunate, however, that there is a great deal of variation in the percentages of women enrolled in the natural sciences, computer science, and engineering in developing countries. Indeed, evidence suggests that young women in developing countries are not as affected as U.S. women by attitudes that computer science is not an appropriate field for women to enter. For example, recent enrollment statistics indicate that more than 50 percent of students enrolled in natural sciences (including IT) in Argentina, El Salvador, Nicaragua, Panama, the Philippines, and Singapore were women. Women comprise at least 30 percent of university level students in natural sciences in a large number of other developing countries, including Jordan, Mongolia, Jamaica, Sri Lanka, West Bank/Gaza, Lebanon, Oman, Tunisia, Algeria, Brazil, Paraguay, Albania, Armenia, and Bulgaria. (4) The largest proportion of women engineers is found in Central and South America and East and Central Europe. (5) Africa remains the area of greatest concern, however, as African women have the lowest participation rates in the world in science and technology education at all levels.

Infrastructure

Since more women than men live in rural areas, the gender gap in Internet access runs parallel to the rural/urban divide. In rural areas where women comprise 60 percent of the population, the resources and infrastructure for IT often are lacking. (6) Connectivity is typically available only in capital and perhaps secondary cities in developing countries. With their special responsibilities for children and the elderly, however, women may find it more difficult than men to migrate to towns and cities. (7) Therefore, increasing women's access to IT involves increasing the availability of communication in areas where women live. Extension of infrastructure, particularly wireless and satellite communications, to rural and peri-urban areas is crucial to this process. In addition, access efforts should focus on the establishment of common use facilities such as telecenters, community phone shops, and other public places convenient and accessible to women.

Information Stores in Burkino Faso

Boutiques d'information illustrate how IT can bring information to rural women in Burkina Faso. Operated by the Government, the *boutiques* deliver agricultural production and marketing information to rural farmers, with a focus on the information needs of women. Currently running at four sites, the project aims to provide a demand-driven information service with an emphasis on interactivity. The project uses local radio to maximize dissemination.

http://www.iicd.org/projests/docs/60.002

For the poor

To date, most women using IT have come from the educated elite. Yet if poor women in developing countries can overcome the constraints that presently prevent their access, they can use IT to help increase access to resources and exercise fundamental rights. To this end, technological and social solutions must respond to the constraints that currently keep poor women from using IT. Among the most interesting potential solutions are those underway in India, a country that has become a source of innovation for IT applications designed to meet the needs of the poor. These include projects by SEWA, Gyandoot/Dhar, Tarahaat, and the Indian National Dairy Development Board. Unfortunately, while many such efforts have been tested in pilot projects around the world, few have proven to be easily replicable.

Barefoot Managers Online

The Self-Employed Women's Association (SEWA) in India is establishing Technology Information Centres in Gujarat to provide computer awareness training and basic computer skills for their "barefoot managers." The IT capacity of women organizers and leaders will strengthen their members' microenterprises. Electronic networking also is expected to strengthen the connections between the various cooperatives working in different sectors and areas.

ILO, "The information technology revolution: Widening or bridging gender gaps." http://www.ilo.org/puclic/english/bureau/inf/pkits/wer2001/wer01ch4.htm; http://www.digitaldivide.org/grants.htm

Uses

Aside from upper-income enclaves, home access to a computer and the Internet is uncommon in developing countries. Most women who use IT do so at work, where, already, gender inequities that are well established in other sectors of the labor force are being replicated.

Most women entering the world of IT use it as a tool of production for routine office work, with far fewer women using it as a tool of communication for the creation and exchange of information. Few women are producers of IT, whether as Internet content providers, programmers, or software designers. Moreover, women in both developed and developing countries are conspicuously absent from IT decision-making echelons.

Among women using IT for higher-level communication and product creation purposes, the most prevalent application is networking for political advocacy, often by women's NGOs who adopted IT early on for this purpose. Women in developing countries also use networking to promote their business interests, an area far less developed than that of political activism but representing a possibility for further development.

E-mail is the application of choice among women's organizations and individual women in developing countries, as time and bandwidth constraints make Web use difficult.

In ministries of developing countries, out of 201 senior government officials responsible for IT, only 11 are women (5.5 percent). However, where women are in top positions, they are significant. Women serve as the ministers of communication or telecommunication in three countries (Mali, South Africa, and Colombia) and deputy ministers in six (Angola, Belarus, the Czech Republic, Ghana, the Kyrgyz Republic, and Tanzania). It is notable that there are more women in senior government IT positions in Africa than in any other region.

Compiled from lists of senior government officials using the ITU Global Directory, Geneva, 2001.

THE IMPACT OF "IT" AND GLOBALIZATION ON WOMEN'S WORK

While globalization has significantly impacted women's IT work in developing countries, in general it has not changed gender divisions of labor. In the first phase of industrialization in Asia and Latin America, women found many IT-related jobs in the assembly of electronics. During the last fifteen years, as manufacturing has become more automated, greater technical and cognitive skills are required than in the first phase, and the number of women employed in IT manufacturing has dropped.

While advances in IT are making many women's manufacturing jobs redundant,

technology is creating other jobs largely taken by women in the service industries, including information processing, banking, insurance, printing, and publishing, where the skill requirements are higher than in manufacturing. The major employment for women in the service sector is in information processing, particularly data entry. The West Indies and the Philippines were the early leaders in this area, followed by China, India, Singapore, Vietnam, and extending most recently to Ghana and Uganda. Other new jobs are in call centers, in Geographical Information Systems (GIS), and in software development, all of which require higher skill levels than data entry. India and Malaysia have captured the bulk of these jobs, but the job market is expanding to other countries as well, notably Togo and Tanzania.

Although IT is a new field, a "gendered" division of labor is already emerging. In general, women tend to be concentrated in end-user, lower skilled IT jobs related to word processing or data entry, comprising only small percentages of managerial, maintenance, and design personnel in networks, operating systems, or software development.

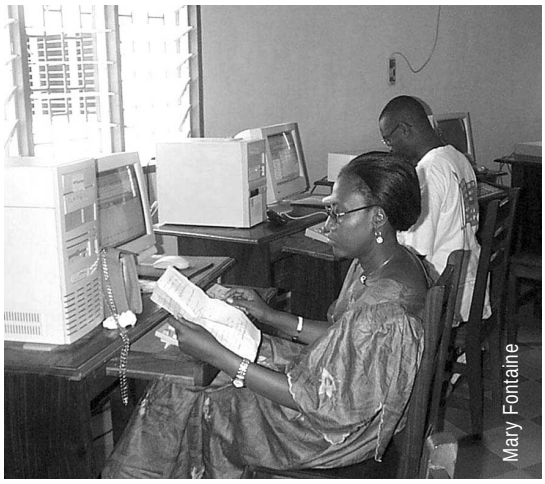
Within the service sector, for example, the major employment for women is in information processing jobs, the high-tech equivalent of the secretarial positions that women have traditionally held. Globally, these jobs are done almost entirely by women, perhaps because of the association of women with typing. (8) In many cases, the jobs were relocated from developed countries because the comparative wages of women in developing countries were one-sixth to one-twentieth of those for women in developed countries. The going rate for data entry in the Philippines is $4-$6/hour while rates are as low as $1.00/hour are found in Jamaica. Medical transcribers in India earn an average of $1200/annum in comparison to $25,000 or more in the US. (9) Nevertheless, the rates are attractive locally and comparable to those of local white collar workers and professionals. (10)

At the same time, some women are making inroads into higher levels of the IT

In the service industries of banking, finance, and insurance, women are concentrated at the lower and less skilled employment levels. In India, for example, women made up 70 percent of the banking workforce by the middle of the last decade. Women's employment in the telecommunications industry in Malaysia reflects similar percentages. However, they tend to be data entry clerks, computer typists, or tellers. The percentages of women in electronic data processing and in management are low, ranging from one to 12 percent in India.

Swasti Mitter, "Who Benefits?" in *Missing Links: Gender Equity in Science and Technology for Development*. DRC/INIFEM/IT: 1995; Sujata Gothoskar, "Computerization and women's employment in India's banking sector," pp. 150-176, in Mitter and Rowbotham, *Women Encounter Technology,* United Nations University Press, 1995.

workforce, especially in Latin America, East and Central Europe, South and South East Asia, and South Africa. In South Africa, for example, women hold 19 percent of data communications and networking jobs, 18 percent in information systems and information technology management, 39 percent in education, training and development, 36 percent in end user computing, and 36 percent in sales and marketing. In India, women occupy nearly 20 percent of the professional jobs in the software industry, (11) and in Malaysia, women are 30 percent of IT professionals. (12) Women reportedly make up 20 percent of the software industry in Brazil. (13)



A businesswoman visits a USAID-supported telecenter in Benin

While there has been much discussion about "teleworking" or "telecommuting" in developing countries, most of these jobs are actually outsourced and located in commercial areas, not in homes. Interestingly, women have expressed a preference for work near but not in their homes, where work traditionally is low-paying and without benefits and where domestic responsibilities might interfere with work.

ECONOMIC EMPOWERMENT

IT can assist women's economic activities in farming, rural development, trade, business, and industry in a variety of ways. For instance, female farmers could greatly increase productivity with access to information on improved agricultural inputs, weather, markets, new production techniques, and farming technologies. Traders and other entrepreneurs also could benefit from marketing information and the opportunity to disseminate information about their businesses.

While business-to-consumer (B2C) e-commerce has generated a great deal of excitement, entry into the industry can be difficult. Women's handicrafts can find niche markets, but marketing and management skills are needed, and supply and delivery problems must be addressed. Some successful developing country e-businesses have targeted their Diaspora markets, for example, and taken advantage of access to local delivery options. Profitable opportunities also exist for women's small-

In India, hundreds of thousands of small telecommunications businesses have been set up offering public telephones for long distance calls. Established with a capital investment of about $2,500, some 300,000 such shops have been created, employing an estimated 600,000 people. According to the International Labour Organization (ILO), women hold nearly half of these jobs. Although they pay only about $500/year, they have been created at the relatively low cost of $1,250/job. The Indian National Council for Science and Technology is working to expand the services that the shops can offer, including voice mail, email, paging, and Internet access.

S. Ramani, "Internet Kiosks in India." http://www.intech.unu.edu/research/past-research/telewrking-India-444/equity-kiosks-summary.pdf.

scale enterprises in business-to-government (B2G) and business-to-business (B2B) markets, where even small firms can participate in international ventures.

IT-enabled communications businesses offer great potential for women entrepreneurs, following the model of Grameen Phone in Bangladesh, *téléboutiques* (storefronts where telephone, fax, email, and sometimes Internet services are available to the public) in Senegal and Morocco, and phone shops in Ghana. Given high demand and low capital and skill requirements, these businesses are within the reach of many women in developing countries where an enabling environment exists. Availability of credit, particularly in the form of micro-credit and credit for small and medium enterprises, is a necessity for women to enter such businesses.

For employment in core sector IT jobs, women in developing countries need to acquire the skills necessary to move into more technical, cognitively oriented, and higher-paying jobs. Degrees in science and technology are the entry tickets to the higher ends of using and producing IT, but women can master many aspects of computer use and maintenance with significantly less training, much of which is available outside the formal education system.

POLITICAL EMPOWERMENT

IT is a powerful tool to improve governance and strengthen democracy. It is particularly useful for giving a voice to women in developing countries who so frequently have been isolated, invisible, and silent. One way that IT can contribute to the political empowerment of women is as a tool for women's networking and social and political advocacy. Also, IT can be used to strengthen women's participation in the political process, improve the performance of elected women officials, increase women's access to government and

its services, and disseminate knowledge. IT is particularly useful for increasing the transparency and accountability of government, an application from which women's advocacy groups already are profiting in countries such as India and Bangladesh.

POLICY

Women's ability to take advantage of IT opportunities is contingent upon enabling social, economic, and telecommunications policies, including those leading to increased educational levels and the extension of communication infrastructure to where women live. To date, developing countries have implemented few concrete policies to promote gender equity in IT. As most developing countries are just beginning to devise national IT policies, however, the time is particularly appropriate for ensuring the inclusion of gender concerns. One way for this to occur is by sensitizing policy-makers to IT issues that affect women. Moreover, out of enlightened self-interest, women in developing countries should involve themselves in IT policy and regulation issues.

Even policies that consider social elements, such as universal access and ensuring the reach of communications to rural areas, will be blind to gender differences if the exercise is treated on the macro level without disaggregating by sex. Without explicit gender analysis and incorporation of the results into policy instruments, it is unlikely that the results will have a positive impact on women. For example, the benefits of IT may bypass women even if their countries develop adequate information infrastructure and service delivery. (14) While awareness of gender issues related to IT is growing, in part through international conferences and literature, presently there are very few places where policies reflect this awareness.

While IT policy and strategy varies considerably from country to country, most policy instruments deal with similar issues. Some of those in which gender concerns are relevant include the following: network architecture and deployment (choice of technology); pricing and tariff issues; licensing issues (ownership and control); strengthening technology innovation (R&D); IT-enabled private sector business development; human resource development for system support; IT labor force participation; data infrastructure; and facilitating access to IT networks, including universal service obligations.

Gender issues should be considered not only in the content of IT policy but also in the process of policy elaboration, implementation, and evaluation. As a means of sensitizing policymakers to these issues, the following table illustrates the differences between a "gender neutral" and an "engendered" approach throughout the policy-making process for universal access.

Table 2: Comparison between gender neutral/engendered policy process for universal access (15)

Policy process steps	"Gender neutral" approach	Engendered approach
Problem definition	Focus on macro statistics such as number and percentrage of households with telephone, average distance to access	Look specifically at telephone penetration by gender, by female-headed households, average time and distance to telephone access, location of phones
Definition of goals and beneficiaries	No specific mention of girls and women	Explicit mention of girls and women, particularly those with low incomes and living in rural areas
Formulation of policy options	Policy to increase number and percentage of households with telephones, promote development of telecenters	Same, but also to increase number of telephones per female-headed household, decrease travel time to access a telephone, locate telecenters easily accessible to women, and promote women as owners and managers
Choice of preferred option	Focus on overall impact	Focus on overall as well as gender-specific impact
Enforcement of new policy	Develop support from consumer-advocate groups, ministerial authorities, and operators	Additionally, develop support from women's organizataions, gender units in policy and regulatory agencies, and grassroots groups involved in communications access
Implementation of policy decision	Define implementation modalities and administer process for compliance	Implementation process should be gender aware. Ensure participation of women's support groups so that implementation achieves goals set forth
Evaluation and monitoring	Process based on baseline statistics and quantitative methods	Based on overeall and sex-disaggregated statistics and goals and qualitative methods of analysis; analysis of not only whether women benefit, but which women do so (class, age. rural/urban location, race)
Termination, renewal, and revision	Decisions based on overall, macro-level impacts	Decision based on overall and gender-specific impacts

CONCLUSION

The Digital Divide has become a central international development concern. Following the Okinawa Summit in August 2000, the Group of Eight nations set up a Digital Opportunities Task Force (DOT Force) to devise ways to eliminate the divide. Moreover, the United Nations places access to IT as the third most important issue facing women globally, after poverty and violence against women.

Given the importance and high profile of this issue, the time is right to act to ensure that women in developing countries can enter the information age. IT holds tremendous potential for improving the lives of women and their families, including opportunities for employment, education, political empowerment, access to resources and information, and communication with a world outside the boundaries of home. Yet without deliberate action, women may be left out of the push to narrow the digital divide.

Although most women in the developing world have had little contact with IT to date, it is not too late to get women in on the ground floor of IT policy and infrastructure development in many countries. It is imperative that the gender dimension of the digital divide be considered early in the process of IT diffusion, rather than as a corrective measure after the fact. The early stage of IT development is a critical time to advocate on behalf of universal access, low-cost extension of services to underserved rural areas, and an enabling regulatory environment. Women's access to technology and training is a basic requirement for their participation in the global information economy. A focused and timely effort to provide women and girls with IT education and skills can enable them to compete successfully in the global information economy and play a leadership role in its development.

The opportunities offered by information technology have to be seized deliberately because both the potential benefits and the costs of not doing so are very high. However, it would be a mistake to approach IT solely from the perspective of not leaving women behind. To fully benefit from new technology, women must act as leaders in its development and as agents of change, using technology to accelerate their economic and social progress. If pursued thoughtfully and strategically, IT can position women as global leaders in the mainstream of those seeking development solutions in the information age.

School girls in Brazil working with computers

ENDNOTES

(1) http://www/isp-planet.com; http://www.cnnic.cn/develst/e-cnnic200101.shtml; The Standard, http://www.iyp.org.Internet; http://emarketer.com, 1 Nov. 2000; http://www.nua.ie/surveys, "Webchek: Women now dominate South African Web use," 4 Apr. 2001; http://www.cyberatlas.Internet.com; Michel J. Menou and Nancy Hafkin, "Connectivity in Africa: use, benefits, and constraints of electronic communications, Synthesis Report-part 2: overview of the project findings." http://www.bellanet.org/partners/aisi/prof/findings.htm; http://cneng.netvalue.com/news/index.htm; ITU, Telecommunications Indicators, 1998; U.S. Bureau of the Census, World Population Profile: 1988, Table A-4, Population by Region and Country, Washington, D.C.: US Government Printing Office, 1999; UNDP, Human Development Report. New York: United Nations Development Programme, 1999 (for gender-related development index, female literacy, and GDP per capita indices.

(2) U.S. women's Internet usage and total home Internet access data are from http://www.nielsennetratings.com/, 12 February 2001, and http://www.nua.com/surveys, 12 March 2001. U.S. population figures are from U.S. Census Bureau, Population Division, based on census data released 28 December 2000.

(3) Seven countries are shown on the attached table for which there are no data available on women users. Data are shown for these countries because they have been identified as among the 20 largest potential Internet growth areas—where governments have made commitments to telecommunications and the Internet as tools of economic growth and where usage is increasing rapidly (http://www.interactiveweek.com, 29 September 1997). It will be interesting to watch women's use of the Internet in these countries.

(4) UNESCO, Statistical Yearbook 1999.

(5) http://qstgateway.wigsat.org/TA/ed/whyeduc.html. AAUW, Tech Savvy: Educating Girls in the New Computer Age: NUA Internet Surveys, 18 July 2000, "AAUW: Girls Turned Off by 'Nerdy' Image of Information Technology," http://www.nua.ie/surveys/qasat/papers/ngp.htm; Rathgeber, "Schooling for What?" in *Missing Links: Gender Equity in Science and Technology for Development.* (IDRC/INIFEM/IT: 1995).

(6) International Telecommunication Union Task Force on Gender Issues, 2000.

(7) UNIFEM and UNU/INTECH. "Gender and Telecommunications: An Agenda for Policy," 2000. http://www.unifem.undp.org/conferen.htm. In Ethiopia, 20 hours of

access per month costs $77 (including local phone costs) while per-capita income is estimated at $110/year.

(8) U.S. Congress study of office automation, cited in Ruth Pearson, "Gender perspectives on health and safety in information processing," p. 279 in Mitter and Rowbothan, *Women Encounter Technology*.

(9) Swasti Mitter, "Teleporting and Toleration in India: Combining Diverse Perspectives and Visions," *Economic and Political Weekly*, 24 June 2000, p. 2247.

(10) Mitter, *"Who Benefits?" in Missing Links,* p. 234.

(11) Mitter, "Teleworking and Teletrade in India," loc. cit.; *Teleworking and Development in Malaysia, Vol. I Integrated Report.* United Nations University/Institute for New Technologies Policy Research Project in partnership with MIMOS Bhd. and UNDP, April 1999, p. 2247

(12) Ng, "Teleworking and Gender in the Information Age: New Opportunities for Malaysian Women?" http://gendevtech.ait.ac.th/gasat/papers/ngp.htm, p. 6.

(13) UNIFEM and UNU/INTECH. "Gender and Telecommunications: An Agenda for Policy," 2000. http://www.unifem.undp.org/conferen.htm

(14) Gillian Marcelle, "Getting Gender into African IT Policy: A Strategic View," pp. 48-49 in Rathgeber and Ofwona, *Gender and the Information Revolution in Africa*.

(15) Adapted from Sonia Nunes Jorge, "Gender Perspectives in Telecommunications Policy: A Curriculum Proposal." Report of Working Group I. Third Meeting of the Task Force on Gender Issues, ITU, Geneva, 9-10 October 2000. Document TFGI 3/4 E. http://www7.itu.int/treg/Events/Seminars/2000/Symposium/English/document26.pdf.